

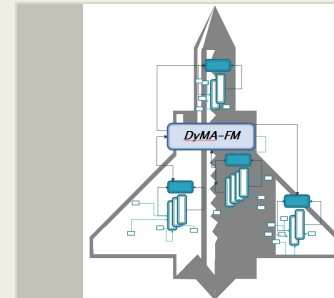
A Real-Time Fault Management Software System for Distributed Environments, Phase I

Completed Technology Project (2013 - 2013)



Project Introduction

DyMA-FM (Dynamic Multivariate Assessment for Fault Management) is a software architecture for real-time fault management. Designed to run in a distributed environment, DyMA-FM enables model-based reasoning and predictive modeling for FM applications. With the appropriate hardware, DyMA-FM can respond to signals at the device level while still placing each signals in context with the larger system and the overall mission objective. This functionality is enabled by a layered software architecture and decision-making hierarchy where each level receives signals from the level below and context from the level above. The contextual processing reduces false alarms and increases fault coverage. The distributed architecture, meanwhile, speeds processing time and reduces the burden on the communication system, enabling faster and more robust response to fault conditions. Building on our current and past experience with distributed system management and mathematical modeling, we will implement and test a prototype of the proposed software. Test data will be provided by Boeing Corporation and will consist of a representative set of signals from an actual spacecraft, collected either under actual use conditions or during a system test. Implementation will require the development of mathematical models that represent the relationships between the test signals, and this portion of the Phase I tasks will result in an analysis of the model's ability to support fault detection and management. Testing will focus on the software's fault coverage, the speed of the system responses, and the system's sensitivity to timing issues such as message lag and message collision. Results from initial tests will be reviewed, and suggested changes to the software will be documented. The final output from the project will include the system prototype, test results, and an analysis of the DyMA-FM's ability to produce superior fault coverage.



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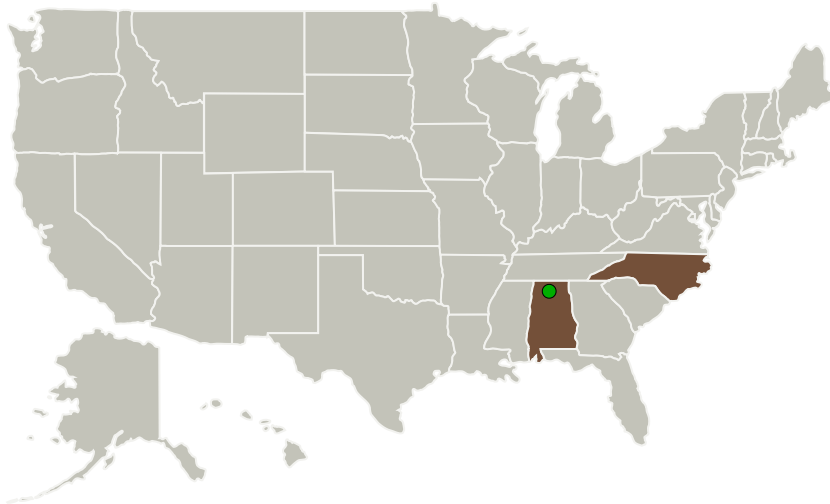
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Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
International Association of Virtual Organizations	Lead Organization	Industry	Durham, North Carolina
● Marshall Space Flight Center (MSFC)	Supporting Organization	NASA Center	Huntsville, Alabama

Primary U.S. Work Locations	
Alabama	North Carolina

Project Transitions

▶ **May 2013:** Project Start

✓ **November 2013:** Closed out

Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/140465>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

International Association of Virtual Organizations

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

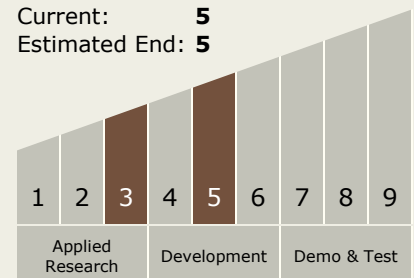
Carlos Torrez

Principal Investigator:

Brad Grinstead

Technology Maturity (TRL)

Start: **3**
Current: **5**
Estimated End: **5**

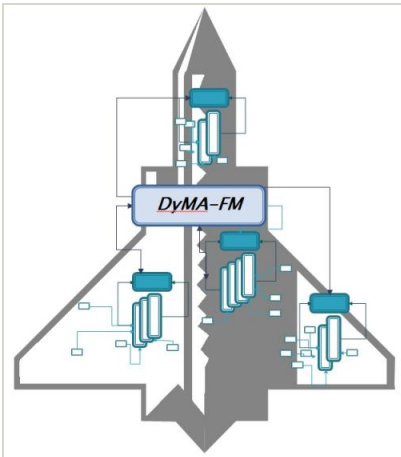


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Images



Project Image

A Real-Time Fault Management Software System for Distributed Environments

(<https://techport.nasa.gov/image/126320>)

Technology Areas

Primary:

- TX17 Guidance, Navigation, and Control (GN&C)
 - └ TX17.2 Navigation Technologies
 - └ TX17.2.3 Navigation Sensors

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System